

# THE SURGERY OF THE LUNGS.<sup>1</sup>

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THE customs of the past and the authority of standard authors have established certain well-defined boundaries beyond which, until recently, the surgeon who was guided by tradition either did not or dared not transgress. But quite within the recollection of the writer has arisen a school of operators who, being first well grounded in pathology, have not hesitated to invade the formerly sacred precincts of the peritoneal cavity, the thorax and the brain, and who shall say they have not been justified by their results? In the surgery of the viscera, the prostate and the brain, wonderfully brilliant results have been achieved.

Ardently following these men in theory, and clinically repeating their results as opportunity offers, the writer firmly believes that "nothing venture nothing win" is a proverb which holds good in surgery as in business, and that underlying it is a basis of probability which our duty to our patients requires us to present to them—presenting the matter so fairly that, whether they decline or accept the venture, we are relieved of all responsibility save for operative skill.

Guided ever, then, by this opinion, I venture to present for your consideration some points concerning the surgery of the thoracic wall and its contents. What I have to say may be conveniently comprised under three headings:

Pneumotomy.

Pneumectomy.

Thoracoplasty.

<sup>1</sup>Read before the Medical Society of the State of New York, February, 1887.

It is not a little surprising to find that Hippocrates wrote clearly and unmistakably not only of abscess inside of and outside of the lungs, but of its surgical treatment. The opening was to be made at the seat of the greatest pain and swelling, at the same time as low as possible, first with a scalpel, then with a bistouri. This was, in effect, the same as our operation for empyæma by simple incision. The cavity was to be kept open by a tent, and washed out morning and evening.

In spite of his precepts, however, it was not until nearly the beginning of the eighteenth century that physicians saw fit to carry out his advice. Even then it was readvanced with hesitation. But about one hundred years ago Pouteau, David and Calisen added the weight of their own convictions, and were followed in due time by Richerand, Lang, Breschet, Macleod and numerous others. But only in our time have systematic experimentation and operation been carried out; notably by Mosler,<sup>1</sup> of Greifswald, W. Koch,<sup>2</sup> of Dorpat, and E. Bull,<sup>3</sup> of Christiana. Pneumotomy is thus shown to be really of ancient origin. On the other hand, pneumectomy—resection of a part or the whole of one lung—is in every respect an operation of the past decade, while the thoracoplastic operation of Estlander is but a little older.

#### PNEUMOTOMY.

To speak now of these operations more in detail, let us first take up pneumotomy. Under this term we include the opening—by knife or cautery—and drainage of a cavity in the lung substance or connecting with its interior; that is, we may have mediate or immediate pneumotomy. Just in proportion to the adhesion of the pulmonary to the costal pleura, around or over the lesion, is the operation one of comparatively small hazard. It is indicated in the following conditions:

- |                              |                               |
|------------------------------|-------------------------------|
| 1. Bronchiectatic abscesses. | } When they can be localized. |
| 2. Tuberculous abscesses.    |                               |
| 3. Gangrene of the lungs.    |                               |
| 4. Pyo-pneumo-thorax.        |                               |
| 5. Hydatid cysts.            |                               |
| 6. Foreign bodies.           |                               |

<sup>1</sup>Berl. klin. Wochschft., 1873, X, 43; 1883, XX, 12.

<sup>2</sup>Arch. klin. Chir., 1873. Deutsch. Med. Wochschft., 1882, p. 440.

<sup>3</sup>Nordiskt Med. Ark., 1881-3. Copenhagen Int. Med. Cong., 1884.

*The operation.*—Except when there are no adhesions this is one of no difficulty. The existence or absence of adhesions can be frequently foretold by the insertion, over the lesion, of a long needle into the lung substance. When the lung is not bound fast to the thoracic wall the needle end will be seen to make a more or less extensive excursion, whereas if adhesions be present, it will be seen to move only with the thorax. So a pneumotomy in a case with adhesions, while requiring probably a costectomy, may yet be one of the simplest of operations, but pneumotomy in a case without them would require probably more or less extensive resection of the thorax wall.

In the former case the suppurating or gangrenous cavity having been located as accurately as possible, and perhaps marked out on the chest surface with a brush dipped in tincture of iodine, everything is made ready as for any aseptic operative procedure. After suitable incision two or three ctm. of one or more ribs are resected, and the pleura exposed. At this point timidity or good judgment may lead to the introduction of an aspirator needle, it being inserted till it reveals the exact direction and depth of the cavity sought for. According to the taste of the operator or the conveniences at hand, he will either go boldly down with the needle as his guide, or will feel his way along by its aid. For this purpose the majority probably would prefer the thermo- or galvanocautery, since without reference to blood-vessels (which can be easily seized) it may be expected to so sear the freshly opened tissue as to lessen danger of absorption. The cavity now exposed, the passage thereto may be enlarged or dilated to any desired extent, with or without removal of more of the bony wall.

Great caution is now called for in the cleansing of the cavity. The irrigating stream that might wash out its contents might also drown the patient. Better then to gently swab it out and use some disinfectant in dry powder, or to simply leave it to drain and cleanse itself. A large size drainage tube may be inserted, with a thick, absorbent, antiseptic dressing properly arranged and protected. According to the location of the lesion and its artificial opening it may be advisable to keep the patient lying on his side, back or face.

In those cases which seem to call for pneumotomy, yet in which no adhesions can be diagnosed, it has been proposed to induce them by some vigorous irritation. Thus Krimer (1830) advised the application of powerful caustics; while Godlee recently has suggested multiple punctures. On the other hand, others like Barry or Graux have proposed to sew the lung to the external opening as the stomach is sewed to the front in cases of gastrostomy.

If the cavity is to be washed at all, salicylic acid solutions would seem to be most suitable for the purpose, and have been especially extolled by Mosler.

*Results.*—In his essay<sup>1</sup>—to which I acknowledge no small indebtedness—Truc has collected statistics of forty-eight cases of pneumotomy for different lesions. To these I am able to add some collected from other sources or since reported, thus making a total of eighty-four, classified as follows:

	CASES.	DEATHS.
Bronchiectasis, - - - - -	23	9
Tuberculous abscesses, - - - - -	13	6
Gangrene, - - - - -	14	6
Pyo-pneumo-thorax <sup>2</sup> , - - - - -	1	1
Hydatid cysts, - - - - -	32	4
Foreign bodies, - - - - -	1	0
	<hr/> 84	<hr/> 28

The mortality rate then is a trifle over 32%. Viewed from one standpoint, this seems, perhaps, too large; but seen in its true light, this means saving 68% of lives that without it would be lost. This, I take it, is no mean showing.

#### PNEUMECTOMY.

Resection of a part or the whole of one lung implies one of those bold operative attacks which only the genius of our era could conceive and the hardihood of our surgeons carry out.

What we at present know of the possibilities in this direction we owe largely to the experimental studies of five men.

<sup>1</sup>Sur la chirurgie du poumon, Paris, 1885.

<sup>2</sup>See my report of Case III at close of this paper.

luck,<sup>1</sup> Marcus,<sup>2</sup> Block,<sup>3</sup> Schmidt<sup>4</sup> and Biondi.<sup>5</sup> Taking the experiments of Block, of Danzig, as fairly representative of work in this line, permit me to briefly allude to some of his work. At the Eleventh Congress of German Surgeons (1882) he summarized the results of operative attacks on some sixty animals of all kinds. Several living animals (dogs) were shown to those present which had undergone partial or total resection of one lung. Numerous preparations were demonstrated exhibiting perfect readaptation of the lung within the thorax after removal of one lobe.

Block's method did not include resection of one or more ribs, but consisted of intercostal incision with dilation of the opening, withdrawal of the lung, and ligature and removal of as much as desired. In almost every instance the wound healed without change of the first antiseptic dressing. Among other things made evident by these and similar experiments is that traumatic atelectasis of one lung is by no means necessarily fatal. It happens in some animals that there is a natural mediastinal communication from one pleural cavity to the other; in such an animal the operation must fail, otherwise not. In fact it is astonishing how little shock or even indisposition Block's experimental animals showed, and how easily they recovered. Block himself never found it necessary to drain either thorax or wound; the operation lasted but two or three minutes, and as the ligature was used there was no intrathoracic hæmorrhage, while that from the wound was insignificant.

On the other hand Gluck and Schmidt have both made more or less extensive resection of ribs, the former removing half or the whole of one lung, the latter taking out wedge-shaped pieces from both lungs—and with success. Both these experimenters resorted to drainage.

<sup>1</sup> Berl. klin. Wochschft., 1881, No. 44, p. 645; Deutsch. med. Woch., 1881, No. 49.

<sup>2</sup> Gaz. méd. de Paris, 1881, I. 695.

<sup>3</sup> Berl. klin. Woch., 1881, Oct. 31; Deutsch. med. Woch., 1881, No. 47. Verhandlung, d. Deutsch. Gessellschaft. f. Chir., 1882, p. 77.

<sup>4</sup> Berl. klin. Woch., 1881, No. 51, p. 757.

<sup>5</sup> Giorn. internaz. d. Sc. med., 1882, p. 759., 1883, p. 248.

Virtually the same results were reported by Marcus. Biondi enjoyed a much larger experience with the procedure and thus summarized his results:—

					OPERATIONS.	SUCCESSES.
Extirpation of right lung.	-	-	-	-	23	12
“ left “	-	-	-	-	34	18
“ both apices	-	-	-	-	3	2
“ middle lobe	-	-	-	-	1	1
“ lower “	-	-	-	-	1	1

Since these experiments Biondi has been creating an artificial tuberculosis pulmonum and then extirpating the infected portion. He infected his animals either by injecting tuberculous sputum into a bronchus, or by incising the thorax, drawing out the lung and injecting some sputum directly into its substance. Nine out of twenty-one animals died of septic pleuritis as the result of these inoculations, and one of rapid tuberculosis. The others began—after sixteen to twenty days—to show signs of infection. In from twenty-five to thirty five days after inoculation the lung involved was resected.

Four of the eleven animals died quickly as a result of the operation. In two of these, as in the specimens removed later from five of the survivors, well marked tubercular deposits could be demonstrated in the excised portion. The seven animals which survived were watched for a long time and not the slightest sign of further tubercular trouble perceived.<sup>1</sup>

At the present time clinical reports of pneumectomies are, obviously, very few in number. The following are, so far as I know, all that are on record.

Krönlein<sup>2</sup> was probably the first to deliberately remove a portion of human lung, except for hernia of the same. His case was that of a girl of eighteen, who presented a recedive of sarcoma of the sixth rib. For its removal he was compelled to resect the whole thickness of the thoracic wall between the fifth and seventh ribs. The tumor had penetrated and contracted adhesions with the lung. These were easily

<sup>2</sup> Berl. klin. Woch. 1884. No. 9.

<sup>1</sup> Wiener med. Jahrbücher. 1884. Hft. 2-3.

separated with the finger without much hæmorrhage. Whereupon a sarcomatous nodule was discovered in the substance of the collapsed lung, which was then excised with scissors. The pulmonary wound was then closed with fine catgut, and the patient rapidly recovered, the traumatic pneumo-thorax rapidly vanishing.

Weinlechner<sup>1</sup> had to deal with a myxochondroma of the right chest wall which had attained the size of the patient's head. In the course of the operation it was found that the underlying ribs had undergone absorption and that the softened mass was connected with the lung. Accordingly the surrounding ribs were resected and the pleural cavity opened. In spite of the consequent dyspnœa the diseased portion of the lung was removed after previous ligature. Antiseptic dressings. Patient recovered from the effects of the operation to die later of septic pleuritis.

Omboni<sup>2</sup> has reported a most interesting case of a tuberculous patient who shot himself, the pistol bullet passing in just to the inner side of and below the left nipple. He diagnosed pneumo-hæmo-thorax and a large posterior extravasation, and on the following day, since the patient was almost in collapse from intra-thoracic hæmorrhage, anæsthetized him and proceeded as follows: An incision 13 ctm. long was made in the third intercostal space; upon opening the pleura a quantity of blood escaped. At the free lower border of the upper lobe appeared a wound; the surrounding tissue was seized with clamps, a catgut ligature thrown around the part, and after ligation it was excised. Also at the lower part of the lung was another wound, which was treated in the same way. Considerable difficulty was met with; twice a halt was called. Solution of sulpho-carbolate of zinc was used for irrigation. Death from sepsis followed in six days. No disturbance in the lung, but suppuration had occurred between the ribs and the serratus. The operator regretted that he had made anterior drainage, and wished that he had either made posterior drainage or none at all.

<sup>1</sup>Wiener med. Woch., 1882. No. 20.

<sup>2</sup>Annali univ. di med. e chir. 1885, Jan. Centralblt. f. chir. 1885, p. 672.

Ruggi<sup>1</sup> has made two pneumectomies. His first case was that of a woman of thirty, who had phthisical cavities in the right apex. She also had fungous arthritis of the knee. The second and third ribs were resected with their cartilages for 9 ctm. and the whole of the upper right lobe removed. Temperature and respiration became normal in six hours. She died on the ninth day of carbolic poisoning.

His second case was a man of thirty. After similar attempts it was found impossible to detach the lung from its pleuritic adhesions. Death supervened in thirty-six hours. In spite of his failures Ruggi holds that the operation will yet prove feasible.

Dr. Anthony Milton, of Georgia (according to Truc<sup>2</sup>), is said to have removed the fifth and sixth ribs, which were carious, and then to have taken away two-thirds of one of the lobes of the right lung. The patient lived four months. I can not learn the nature of the lesion that led to so severe an operation.

Block, whose experiments on animals have already been alluded to, believed so firmly in the infallibility of pneumectomy that he would fain practice it on man. Accordingly he operated on both apices of a young lady relative who was supposed to have apical lesions. She quickly succumbed, and her death led to a medico-legal inquiry, in the course of which it was claimed that her lungs were not affected. Chagrined and distressed he sought solace in suicide, his death quickly following hers.

A case of extreme interest and closely bearing on our subject deserves mention here, though not exactly one of pneumectomy.

König<sup>3</sup> had a case of osteochondroma of the sternum upon which he made a masterly operation. The sternum was sawed through at the level of the first rib and all of it below this line was removed, with three ctm. of the ribs on each side. After separating all the bony connections, while lifting the bone out

<sup>1</sup> La Tecnica della pneumectomia nell'uomo. Bologna, 1885.

<sup>2</sup> L. c. p. 31. *Petit: Rev. méd. et chir.* 1877, b. 791.

<sup>3</sup> *Centribl. f. Chir.*, 1882, No. 42. p. 681.



of its mediastinal seat the right pleural sac was opened; this opening was tamponed. The pericardium was next exposed, and an infected point was excised—thus opening its sac. In the subsequent course of the operation both these openings were closed by suture. The operation lasted two hours and a half. The patient completely recovered.

Fischer, of Breslau, had also a similar case with equally happy termination.

*Indications.* For the present, at least, I should consider pneumectomy to be indicated for:—

Hæmorrhage, from a wound of the lung.

Hernia of the lung—traumatic.

Neoplasms, especially those of the pulmonary environment which involve the lungs.

Disease (tubercular) of one lobe?

Omboni's case given above, demonstrates the brilliant possibilities of pneumectomy for the relief of hæmorrhage.

P. Vogt<sup>1</sup> was decidedly of the opinion that it was the only thing to do in such cases.

A portion of lung, either gangrenous or healthy, has been repeatedly removed when protruding from the thorax. But with such cases I have not concerned myself in this paper and so do not propose now to consider them. I therefore simply mention the condition as an indication for the operation.

That even cancer of the lung is not always beyond operation has been made clear by cases quoted. Primary cancer is unlikely to be recognized in time to justify operation; secondary deposits will probably prove too diffuse; yet there is now no reason for shrinking from a tumor of the thoracic wall for fear that it may involve the underlying lung.

Thus far the results of pneumectomy for tubercular disease have certainly not been encouraging. The doubly sad termination of Block's case is likely to deter men for some time from repeating his essay. Nevertheless, advanced surgeons the world over regard tubercular disease at the outset as *usually* a local one, curable in proportion to its accessibility and

<sup>1</sup> Greifswald. chirurg. Klinik. 1884.

early attack. So while I would not say that we are just yet prepared for this sort of thing, I should neither be surprised at its attempt by some venturesome spirit nor condemn it; and I look forward to the time—perhaps just before the millenium—diagnosis and technique having in the meantime been perfected, when excision of the tuberculous apex may be the recognized treatment. Still I have placed a judicious and provisional question-mark after it in the above list of indications.

*Operation.* Concerning the operative attack I do not need to say much here. It is summed up in the following:—Thoracotomy, *i. e.* opening of the chest; this may be by simple incision over an intercostal space, or by section or subperiosteal resection of one or more ribs, according to circumstances. Block found that he could remove even infiltrated lobes by simple incision. Removal of so much of the lung as may be called for, probably in cuneiform piece; this preferably by ligature followed by the scissors. If desired the pulmonary wound may be closed by bringing together the pleural edges over it, just as the peritoneum is sewed over the stumps of certain abdominal tumors. Next comes the matter of drainage; under ordinary circumstances this interferes with expansion and adds to the risk of infection. In all probability it would not be necessary in uncomplicated cases. Block never saw inflammation set up in the stump or in the pleural cavity by leaving the slight amount of blood which escaped during or after the operation. He moreover held that if empyæma occur, it may be treated on well known principles. On the other hand Truc asserts that drainage is necessary, though it does not appear that he speaks from any personal experience. Beyond this the ordinary antiseptic dressings. Truc thus concludes his chapter devoted to pneumectomy:—“*Ces pensées hardies seront-elles réalisables? Espérons le.*”

#### THORACOPLASTY.

Under this heading I desire to call your attention to the

operation of Estlander<sup>1</sup> and its modifications, for those cases of empyæma which have either resisted all other methods of treatment, or which when seen are evidently only suitable for it. His first communication was published in 1879.<sup>2</sup> To briefly state the conditions upon which his operation is based I would remind you that in a chest full of pus the lung is more or less collapsed and that its expansion is impossible prior to removal of the pus. When this pus has been long present the pleura becomes enormously thickened and the lung loses its power to completely expand. If now this pus be evacuated, air must take the place of a part of it at least. When the pus is removed by incision, the air has free access, the lung can only expand so far, and the bony wall of the chest can not sink in to meet it part way because of the rigidity of those bony arches, the ribs. When adhesions are present that part thus bound to the chest wall cannot collapse, but the balance can and does. In either case we have to do virtually with a large or small cold abscess, whose inner wall, though somewhat flexible, can not "give" very much, and whose outer wall is absolutely immobile. This condition does not obtain in a recent empyæma; it is met with in cases of several months or years' standing.

In such cases almost any section of the ribs which shall break their rigid outline and permit them to bend or sink in, will meet the indication. As my colleague, Dr. Mynter, has recently pointed out,<sup>3</sup> Estlander removed in his first operation almost the whole of one rib, but later advised to remove smaller parts of several ribs, according to the size of their cavity, 3-6 ctm. of three to six ribs. His whole theory of work was to take from the bony arches their key-stone, thus allowing their sides to fall inward and together. It was later found that simply doing this was not always enough, so Schede, of Hamburg, recommended removal of some part of the bony chest wall. From the reports which I append of my own cases

<sup>1</sup> It is stated that this operation, now generally known as Estlander's, was conceived by Gayet and actually practised by Létévant. Simon and Heincke had also prepared the way for it, nevertheless the first to systematically treat these cases in this way and to recommend it as a definite procedure was Estlander, a surgeon of Helsingfors, who died a few years ago.

<sup>2</sup> Nordiskt Med. Ark. 1879. XI.

<sup>3</sup> Medical Press of Western New York, Nov., 1886, p. 626.

it will be seen that in the first of them I worked entirely on this principle (and before I had learned of Schede's modification); while in the second and third I did even much more, that is, I took away a large portion of the chest wall in front and another at the rear, with, in the second case, a remarkably rapid recovery.

Many of these cases with which we thus have to deal are complicated by pleural fistulæ, either spontaneous or the result of treatment by canula or by incision. Others are of long standing, where yet no outlet has been established. The former are really more favorable, largely because the lung will be found less compressed and more expansile. The suppurating or empyæmic cavity with an outlet tends to become smaller on account of thickening and cicatricial contraction of the pleura. That this contraction may be most persistent and forcible is amply proven by the scoliotic deformity which is so marked a feature of nearly every old case of this kind.

The thickening of the pleura, which at times amounts to half an inch or more, is no contraindication to the operation, but rather an important indication in its favor. By this time it has lost all its proper characteristics of a serous membrane. Of course I need scarce remind you of the danger of leaving these cases alone; amyloid degeneration, hectic, chronic septicæmia, general tuberculosis, exhaustion—these are a few of the untoward possibilities.

*Operation.* Of the operation itself I need scarcely speak here in minute detail. Subperiosteal resection of a rib or two is by itself an insignificant procedure; and while Estlander's operation can scarcely be termed insignificant, yet I have never known of a case where it by itself proved fatal. Patients fail to recover, or even die as my third case died (although this was vastly more than an ordinary Estlander operation), but not primarily from the operation so far as I know.

It is made in the Commune Hospital in Copenhagen, by its originator's compatriots, with a single incision, usually in or near the axillary line, perpendicular to the direction of the ribs; 4-6 ctm. of four to six ribs being removed through the incision.<sup>22</sup> This may be taken as a fair sample of its usual per-

formance. The first operation in this country was made in 1882 by Fenger, of Chicago, a former personal friend and countryman of Estlander's.<sup>1</sup> By reason of their surroundings we usually try to avoid the first two and the last two ribs, although Schneider removed a part of the clavicle and the second rib with success. Some have recommended to unite by suture the soft parts over the line of section. It may be a good plan to unite the skin edges, but I have so far carefully refrained from uniting the pleural margins; indeed I have deliberately removed a longitudinal strip of this thickened lining for the purpose of securing greater collapse.

In many cases it is advisable to make a posterior drainage outlet. Concerning the artificial pneumo thorax produced in all these cases, as well as in those of pneumectomy, we need have no apprehension, since abundant experience has proved that of itself it has been rather a bugbear than a real element of danger. As showing how far this line of attack may be followed, Krönlein has recorded<sup>2</sup> a case of pyo-pneumo-thorax in which when he opened the pleural sac he saw a sloughy abscess cavity in the collapsed lung; this he washed out freely and drained with the best results.

I subjoin abstracts of the clinical histories of three recent cases of my own which on account of their intrinsic interest, may find a place with others similar.

CASE I. *Long Standing empyæma with fistulous opening; thoracoplastic costectomy. Recovery.* B. Kennedy, æt. 32, a patient of Dr. J. H. Pryor's at the Erie county almshouse. No accurate history to be elicited, save that in 1883 he had pleurisy on the left side, since which time he has been sick. For at least a year there has been a sinus a little below and to the outer side of the left nipple, from which pus has discharged freely. By the courtesy and with the assistance of Dr. Pryor I operated March 3, 1886. I first resected about three centimetres of the fifth rib for exploratory purposes. Finding the cavity a large but sharply circumscribed one, I made a free incision along the fifth rib, reflecting the soft parts for some distance on each

<sup>1</sup> Mynter, l. c. p. 628.

<sup>2</sup> Med. News, Sept. 23, 1882.

<sup>3</sup> Lancet (Am. Ed.), Sept., 1884, p. 225.

side. Through this I made a subperiosteal resection of 6 ctm. of the third rib, 10 ctm. of the fourth, 13 ctm. of the fifth, 14 ctm. of the sixth. By so doing I unroofed an abscess cavity some 17 ctm. in its longest diameter, its posterior margin being to the inside of the angles of the ribs, and some 12 ctm. in its greatest transverse diameter. The costal pleura was in some places fully 2 ctm. thick. This cavity I scraped thoroughly with the sharp spoon, and stuffed with iodoform gauze. Three deep silver sutures were used for approximation of the soft parts. No ligatures were required.

Improvement was rapid. He had been a confirmed invalid, spending most of his time in bed. He soon became an attendant in the ward; in two months was as strong as ever. The old abscess cavity was not quite cicatrized over for eight months. It healed with a depression in the side into which one might almost lay a fist, but recovery was positive.

CASE II. *Extensive Empyæma, of long standing. Operation. Recovery.* H. Chapman, æt. 20. Brought to me by Dr. John Miller, of Lancaster, Erie county. In December, 1882, patient had a pleurisy (left side) followed two weeks later by a relapse. In March following he had the third attack on that side. His empyæma was not recognized as such till June, when a physician made an incision and evacuated about three and a half quarts of pus. Since that time he has had constant discharge from the side. He had but recently come into Dr. Miller's hands. On examination I found the left chest wall much sunken in, the heart pushed way off to the right; two fistulous openings, one 5 ctm. above the left nipple, the other the same distance below, the former recent, the latter the original. Respiratory sounds almost absent over lower half of left chest. Already some tendency to lateral spinal curvature. General condition good.

August 19, 1886. Operation at the Buffalo General Hospital, in the presence of a number of medical men. A short piece of sixth rib resected first, for exploration. By this it was made plain that the left lung was almost entirely collapsed. I accordingly made subperiosteal resection of 5 ctm. of the fourth rib, 10 ctm. of the fifth and sixth, and 8 ctm. of the seventh and eighth, *in front*. Then making a long incision posteriorly near the inner margin of the scapula I removed 5 ctm. of the fifth, 8 ctm. of the sixth and seventh and 5 ctm. of the eighth. My hand could be easily passed to the upper margin of the pleural cavity so as to force upward the tissues above the clavicle; I had also opened down to the diaphragmatic level, the relations of the diaphragm being altered. So far as I could I scraped

out all the fungous lining of this large cavity, and touched it all up with a 50% solution of zinc chloride. A very few sutures were used—perhaps four.

The operation, which will be seen to have been more extensive even than Schede's modification contemplated, was followed by comparatively slight shock.

For a week or more, at each dressing, I was able to literally see through my patient; with the eye applied at one thoracic window I could recognize a face placed a foot from the other. Recovery was astonishingly rapid, in less than three months he was practically well, and within less than four months not a drop of pus could be found anywhere about him.

CASE III. *Pneumo-pyo-thorax; Thoracoplastic Resection. Death from Pneumonia.* Geo. Hölker, æt. 20, Leon, Cattaraugus county, New York. A little over two years ago had pleurisy with effusion. Has never been well since then. Six months ago empyæma was recognized and he was then, and has since then twice been aspirated, a large amount of pus being removed at each sitting. Sent to me by Dr. Rood. Nov. 20th, 1886, pleural sac evidently refilled. I drew off with aspirator about eight fluid ounces of horribly offensive pus. He was constantly expectorating sputum having the same appearance and odor. His respiration was exceedingly embarrassed, but his pulse and temperature but slightly altered. Diagnosis was an empyæmic abscess connecting with some bronchus. After vigorous stimulant treatment I operated in my clinic at the General Hospital, Nov. 27th.

My procedure in this case was to make a long posterior incision through which I removed about 4 cm. of the fourth, fifth, sixth seventh, eighth, and ninth ribs. The pleura here was very thick. Evacuation of about a gallon of some very foetid pus. After its removal and the retraction of the thoracic walls a small opening was seen about the middle of the posterior surface of the lung through which air bubbled with each respiration. Patient was then turned over and an attack made anteriorly. Here I removed about 3 cm. of the third, fourth, fifth and sixth ribs. On cutting through the thickened pleura I found to my surprise that to its under surface was adherent a portion of the lung. So tough and thick were the adhesions and so changed the lung tissue that I had cut into the lung, before I realized it, the incision being 8 cm. long and 2 cm. deep. Through this bloody froth came freely, and one or two vessels spurted vigorously. The latter I caught and ligated, the former I checked by sponges. By this time he was so weak that I gave up further effort to

get into the pleural cavity in front. The wound in the lung I dressed with styptic cotton. No sutures employed. Patient in extreme shock.

From this however he rallied, and was thenceforth free from his foetid expectoration. He did well till Nov. 30th when his sputum became pneumonic in character. Râles were heard in both lungs, and the breathing in the right became bronchial toward the last. Dec. 1st he died, as the autopsy showed, of pneumonia and exhaustion.

#### BIBLIOGRAPHY.

For this I would refer to Truc's essay already quoted from. The following references are, however, not included in his list.

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